D.T.E. 02-12

Petition of NSTAR Gas Company, pursuant to G.L. c. 164, § 69I, for approval by the Department of Telecommunications and Energy of its Long-Range Forecast and Supply Plan for the five year period 2001/2002 through 2005/2006.

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I. INTRODUCTION AND PROCEDURAL HISTORY

On February 4, 2002, pursuant to G.L. c. 164, § 69I, NSTAR Gas Company[1] ("NSTAR Gas" or "Company") filed with the Department of Telecommunications and Energy ("Department") a petition for approval of its Long-Range Forecast and Supply Plan ("Plan") for the period of 2001/02 through 2005/06. The petition was docketed as D.T.E. 02-12.

NSTAR Gas, a subsidiary of NSTAR, is a regulated natural gas distribution utility headquartered in Southborough, Massachusetts. NSTAR Gas serves approximately 246,000 customers in central, eastern, and southeastern Massachusetts. Pursuant to notice duly issued, the Department conducted a public hearing and procedural conference in Boston on April 11, 2002. The Attorney General of the Commonwealth ("Attorney General") filed a notice of intervention as a matter of right, pursuant to G.L. c. 12, § 11E. The Department granted intervenor status to the Division of Energy Resources ("DOER").

An evidentiary hearing was held at the Department's offices on October 8, 2002. NSTAR Gas presented three witnesses in support of its Plan: Barbara Stamos, senior gas-supply planning analyst, NSTAR Gas Company; Robert S. Koster, gas-supply planning analyst, NSTAR Gas Company, and Mary Helen Novak, managing director, energy consulting services, DRI-WEFA. The evidentiary record consists of the Company's initial and revised filing, 167 information requests and responses, and six record requests and responses. The Attorney General and DOER submitted discovery. The Attorney General cross-examined

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[1] NSTAR is a Massachusetts business trust. Commonwealth Gas Company is a subsidiary of NSTAR. On March 26, 2001, Commonwealth Gas Company changed its name to NSTAR Gas Company.

witnesses. NSTAR Gas and the Attorney General's Office filed initial briefs. NSTAR Gas filed a reply brief. DOER did not submit a brief.

II. PLANNING STANDARDS

A. Standard of Review

Pursuant to G.L. c. 164, § 69I, the Department is required to ensure "a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost." G.L. c. 164, § 69I. In accordance with this mandate, the Department reviews the long-range forecast of each gas utility to ensure that the forecast accurately projects the gas sendout requirements of the utility's market area. G.L. c. 164, § 69I. A forecast must reflect accurate and complete historical data, and reasonable statistical projection methods. G.L. c. 164, § 69I; 980 C.M.R. § 7.02 (9)(b). Such a forecast should provide a sound basis for resource planning decisions. Colonial Gas Company, D.P.U. 96-18, at 4 (1996); Bay State Gas Company, D.P.U. 93-129, at 5 (1996); Holyoke Gas and Electric Department, D.P.U. 93-191, at 2 (1996); Berkshire Gas Company, 16 DOMSC 53, at 56 (1987) ("1987 Berkshire Gas Decision").

In its review of a forecast, the Department determines if a projection method is reasonable based on whether the method is: 1) reviewable, that is, contains enough information to allow a full understanding of the forecast method; 2) appropriate, that is, technically suitable to the size and nature of the particular gas company; and 3) reliable, that is, provides a measure of confidence that the gas company's assumptions, judgments, and data will forecast what is most likely to occur. D.P.U. 96-18, at 5; D.P.U. 93-129, at 5; D.P.U. 93-191, at 2; Haverhill

Gas Company, 8 DOMSC 48, at 50-51 (1982). Specifically, the Department examines a gas company's: 1) planning standards, including its weather data; 2) forecast method, including the forecast results; and 3) derivation and results of its design and normal sendout forecasts. See D.P.U. 96-18, at 5; D.P.U. 93-129, at 5-6; Colonial Gas Company, D.P.U. 93-13, at 6 (1995); see also Boston Gas Company, D.P.U. 94-109 (Phase 1), at 9 (1996). As part of the review of the forecast, the Department also examines the company's scenario analysis, which is used for evaluating the flexibility of the company's planning process, including any cold-snap[2] analysis and sensitivity analysis. Boston Gas Company, 25 DOMSC 116, at 200 (1992) ("1992 Boston Gas Decision"); see D.P.U. 93-129, at 23-25; D.P.U. 94-109 (Phase 1), at 61-66.

B. Previous Sendout Forecast Review

The last review completed for a forecast and supply plan filed by the Company was described by the Department in its decision in Commonwealth Gas Company, D.T.E./D.P.U. 96-117 (2000) ("2000 Commonwealth Gas Decision") in which the Company's Forecast and Supply Plan was approved with directions for future filings. See 2000 Commonwealth Gas Decision. Specifically, the Company was directed in it next forecast filing: (a) to incorporate its transportation migration experience as well as the experience of other Massachusetts local distribution companies ("LDCs") into its forecast; (b) to continue to provide comprehensive cost/benefit evaluations to justify the appropriateness of its selected design year standard in light of the changes that will take place in the gas industry; and (c) to continue to provide

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[2] A cold-snap is a prolonged series of days at or near design conditions. D.P.U. 93-13, at 66; Commonwealth Gas Company, 17 DOMSC 71, at 137 (1998).

comprehensive cost/benefit evaluations to justify the appropriateness of its selected design day standard in light of the changes that are taking place in the gas industry. 2000 Commonwealth Gas Decision. To the extent that such conditions remain appropriate for discussion, this Order addresses the Company's compliance with the Department's Directives.

C. Planning Standards

The first element of the Department's forecast review is an assessment of a company's planning standards which are used as a basis for projecting its sendout forecast. The sendout forecast is used to ascertain the adequacy and cost of a company's supply plan.[3] The Department reviews a company's planning standards to ensure they are reviewable, appropriate, and reliable.

The Department's review of planning standards is two-fold. First, the Department reviews the Company's weather data – the basic inputs upon which a company's planning standards are based. Second, the Department reviews the company's planning standards – how the Company arrived at its normal year, design year, and design day standards.

1. Weather Data

a. Background

The Company indicates that it utilized a 46-year weather database to develop its normal and design planning standards (Exh. DTE 1-5). NSTAR Gas states that a large sample size of at least 30 observations is recommended to fit a normal distribution to a data set and that including more observations strengthens the assumption of normality (id.). In accordance with

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[3] Planning standards serve as guidelines to help an LDC evaluate whether it requires new resources or whether it has a surplus.

the Department's directive in D.P.U. 92-159, at 13, NSTAR Gas utilized Effective Degree Days ("EDD") data for all weather-related planning and resource acquisitions since 1996 (Exh. DTE 1-1). NSTAR Gas states that the Heating Degree Day ("HDD") data utilized in this filing, is recorded and maintained by the Company at three different locations within the Company's service territories: Cambridge, New Bedford, and Worcester (id.). NSTAR Gas states that the Weather Services Corporation ("WSC") provides the wind speed data to the Company to convert the HDD data into EDD (id.). The Company notes that the locations of the temperature and wind speed recording stations and their historical consistency provides an appropriate source of weather information for the Company's service territories (id.).

b. Analysis and Findings

The Department determines that the Company's 46-year database is comparable to other weather databases approved previously by the Department. Fall River Gas Company, D.T.E. 99-26, at 4 (2000); 2000 Commonwealth Gas Decision, at 28; D.P.U. 93-13, at 10. The Department finds the Company's use of the weather data is specific to the Company's service territory, and therefore appropriate for input into its planning standards. Therefore, the Department concludes that the weather data used by NSTAR Gas is reviewable, appropriate, and reliable.

2. Normal Year

a. Description

NSTAR Gas states that it constructed its normal year standard based on the daily average of 46 years (1955-2000) of EDD data (Exh. NGC-1, at 12-13). The Company further states that it modified the 46-year daily average EDD data to reflect more accurately the daily

distribution of EDDs within each division (id. at 13). To do this, NSTAR Gas compared the statistical total number of degree days in each division to the actual totals in each of the 46 years of divisional weather history. Next, the Company selected the actual year that was closest to the statistical EDD total. Developing the average EDD required computing the ratio of each month's statistical degree days to each month in the statistical normal year, and multiplying each actual day's EDD by this ratio (id.). NSTAR Gas asserts that the selected methodology for developing its normal year standard combines the statistical strength of a 46 year arithmetic average EDD with a divisional distribution pattern based on historical experiences (id.). The resulting modified normal year EDD standards are 6,140 for the Cambridge Division; 6,018 for the New Bedford Division; and 7,185 for both the Worcester and Framingham Divisions (id.).

b. Analysis and Findings

The use of an arithmetic average historical EDD data to establish a normal year standard has previously been approved by the Department. North Attleboro Gas Company, D.T.E. 01-47, at 7 (2001); Fall River Gas Company, D.T.E. 99-26, at 5-6 (2000); 2000 Commonwealth Gas Decision, at 30. Because the Company's planning circumstances are similar to that found in the aforementioned, the continued use of an arithmetic average historical EDD remains relevant and appropriate. Based on the foregoing reasons, the Department finds that the Company's methodology for determining the normal year standard is reviewable, appropriate, and reliable.

3. Design Year and Design Winter Standards

a. Background

The Company's previous supply plan adopted a 1:50 design year and a 1:50 design day (Exh. NGC-1, at 14-15). In response to the Department's directive in D.T.E. 96-117, the Company continues to provide comprehensive cost/benefit evaluations to justify the appropriateness of its selected design day standard in light of the changes that are taking place in the gas industry (id. at 11). Thus, for the present filing, NSTAR Gas engaged in (1) updating the cost/benefit analysis based on current input variables to assess the continued accuracy of the previous study, and (2) analyzing major factors that further narrow the Company's selection of appropriate design planning standards (id.).

The previous design standard analysis was updated using current weather data, probability analysis, and marginal cost assumptions. The updated results are consistent and yield a similar range of design planning standards to the planning standards of the previous filing. See 2000 Commonwealth Gas Decision, at 31-32, 35-36. NSTAR Gas established a range of design planning standards, with a corresponding broad range of temperature probabilities, based on the intersection of the marginal benefits associated with avoiding gas shortages and the marginal cost of supplies (Exhs. NGC-1, at 15, Att.3, ES-I).

The Company determined the five coldest winter periods for each division and their respective probabilities for the last 45 years (id. at 15-16). NSTAR Gas states that the analysis indicates that the severity of temperature varies from division to division (id. at 16). The Company asserts that it conducted similar statistical analysis of peak day for each of the divisions (id. at 17).

NSTAR Gas evaluated the effects of changes taking place in the gas industry on its selection of design planning standards (Exh. NGC-1, at 20). The Company notes that the growing presence and role of marketers in today's gas-commodity market could result in NSTAR Gas exercising more flexibility in its gas-purchasing approach as a result of the increased gas-procurement options (id. at 21). Further, NSTAR Gas indicates that the development of the market centers decreases the need for the LDCs to hold as much pipeline capacity from the wellhead or production area. Instead, an LDC can reduce its firm capacity commitments at the wellhead or production area and purchase gas in market areas downstream of those originating points for delivery to the city-gate (id. at 22). In addition, the Company states that the expansion of transportation options and the growth of eCommerce for gas may enable the market to adjust to demand conditions quickly (id. at 24).

b. Description of Design Winter and Design Year Standards

NSTAR Gas states that its design winter standards[4] are: 5,511 EDD for the Cambridge division; 5,313 EDD for the New Bedford division; and 6,162 EDD for the Worcester and Framingham divisions (Exh. NGC-1, Att. 3, at 23). These standards,[5] according to the Company, are based on the 1:33 winter-season probability of occurrence, and therefore differ

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4 The Company indicates that some companies use a design year standard instead of a design winter standard. A design year standard would be appropriate if a company had to be concerned about the potential for inadequacy of supplies at any point of time outside the winter season. Under current market conditions and given the amount of pipeline maximum daily quantity available to NSTAR Gas, a design winter standard is appropriate for NSTAR Gas (Exh. NGC-1, Att. 3, at n.3).

5 The formula used by the Company to compute its newly developed design year standard assumes the following relationship: Normal Winter EDDs + (Standard Deviation of Winter EDDs x 1.88).

from the Company's previous design winter planning standard of 1:50 (Exh. NGC-1, at 24-26). The design winter standard, according to the Company, represents the most extreme weather pattern that can be reasonably expected to be encountered over the course of a winter season, given the Company's historical weather data in the LDC service territory

The Company indicates that the greater liquidity in market centers downstream of the production areas has resulted in the Company reducing its 1:50 design winter standard to a 1:33 design winter standard (id. at 24). NSTAR Gas notes that the selection of its design winter planning standard can be less conservative because, over the course of the heating season, the Company has the ability to supplement its available gas resources with short-term supply arrangements originating in upstream market centers (id.). If necessary, NSTAR Gas states that in the event it experiences weather conditions that exceed the Company's design winter standard over the course of a heating season, NSTAR Gas can rely on these short-term arrangements throughout that period to supplement and conserve portfolio resources in order to meet colder than design weather conditions (id. at 25).

The Company states that its design year standards are: 6,735 EDD for the Cambridge division; 6,638 EDD for the New Bedford division; and 7,803 EDD for both the Worcester and Framingham divisions (id. at 27). These standards, according to the Company, are also based on the 1:33 winter season probability of occurrence (id. at 24-26).

c. Positions of the Parties

i. Attorney General

The Attorney General asserts that in the Company's last approved forecast and supply plan, the Department noted that the Company may have been too conservative in its selection of design standards, based on a 1:50 probability of occurrence and that the Company should review and justify the appropriateness of its design standards as part of the its next filing (Attorney General Brief at 2-3, citing 2000 Commonwealth Gas Decision, at 37). In response to the Department's concerns, the Attorney General affirms that the Company has proposed a less conservative design winter standard, based on a 1:33 probability of occurrence (id. at 3). According to the Attorney General, the Company justifies its proposed standard by arguing that it "has the ability to supplement its available gas resources with short-term supply arrangements originating in upstream market centers" (Attorney General Brief at 2-3, citing, Exh. NGC-1-S, at 24). The Attorney General maintains that this rationale conflicts with the Department's requirement that a company must have sufficient firm resources in place to serve its firm customer gas loads without relying on the uncertainties of the short-term non-firm market during periods of severe winter weather (Attorney General Brief at 2-3, citing Colonial Gas Company, D.T.E. 98-90, at 7, n.6 (2000)). Therefore, the Attorney General concludes that the Department should reject NSTAR Gas' lowered design standard as a basis for determining whether the Company has sufficient gas resources (Attorney General Brief at 3).

ii. NSTAR Gas

The Company requests that the Department approve the proposed design winter standard because its is based on a comprehensive evaluation of alternative design standards, is responsive to the changes in the marketplace, and is consistent with the standards of other LDCs in Massachusetts (NSTAR Gas Reply Brief at 3). Further, NSTAR Gas argues that the Attorney General's citation to the Department's decision in Colonial Gas Company, D.T.E. 98-90, at 7, n.6 (2000), is inapposite (id. at 2-3). The Company notes that the Attorney General failed to identify the fact that the Department was addressing design day requirements, for which there would be insufficient time and certainty to satisfy a shortfall in a single day (NSTAR Gas Reply Brief at 3). In addition, NSTAR Gas contends that the Department identified the short-term *non-firm* market, and not the short-term firm transactions relied upon by the Company over the design winter period (id. citing Exh. NGC-1-S, at 24). Accordingly, NSTAR Gas concludes that the Attorney General's argument that the Department should reject the Company's 1:33 design year standard is without merit and argues that the Department should approve the Company's Long-Range Forecast and Supply Plan (NSTAR Gas Reply Brief at 3).

d. Analysis and Findings

In its Final Order on Evaluations of Standards and Procedures for Reviewing Sendout Forecasts and Supply Plans of Massachusetts Natural Gas Utilities, 14 DOMSC 95 (1986) ("1986 Gas Generic Order"), the Siting Council notified gas companies that renewed emphasis would be placed on design criteria "to ensure that those criteria bear a reasonable relationship to design conditions that are likely to be encountered." 1986 Gas Generic Order, at 96-97,

104-105. The Siting Council required each company, in each forecast filing, to include a detailed discussion of the basis upon which it selected the design weather criteria, with particular attention to the frequency with which design conditions are expected to occur, and to the effect of the design standard on the reliability of the company's forecast and the cost of its supply plan. Id.

The Department finds that the Attorney General has erred. First, the Attorney General appears to misquote the Company. In particular, NSTAR Gas indicates that, if weather conditions exceeding the Company's design winter standard would occur over the course of a heating season, the Company can rely on these arrangements throughout that period. Second, the Attorney General references a Department directive regarding the development of a design day standard, and proposes that it be applied on the development of design winter standards. In today's gas commodity market, natural gas is readily available. The Company has shown that it has adequate supplies to meet its design winter standard, and that, if need be, it would be prepared to acquire additional supplies. Regarding the second point raised by the Attorney General, the Department notes that the primary difference in the shortfalls between a design day and a design year lies in the fact that in the case of design year an LDC has a longer period to acquire resources if it experiences weather colder than its design winter standard.

The Department notes that the Company has complied with Department precedent in this area by using a methodology approved by the Department in the Company's previous supply plan. See 2000 Commonwealth Gas Decision, at 31-33. The Department finds that the Company updated the weather input data, and both the probabilistic and the cost/benefit analyses to develop the design winter and design year standards for the present filing. Further,

the Department finds that in complying with the Department's directive, the Company has accounted for the recent structural changes in the gas industry to select its design winter standard. Thus, given the greater liquidity in market centers, the Company has reduced its 1:50 design winter standard to a 1:33 design winter standard in its present filing. The Department finds that the method for determining the design winter standard is appropriate, reviewable, reliable, and provides a reasonable basis for resource planning decisions.

4. Description of Design Day Standard

a. Description

NSTAR Gas states that its design day standards of 80 EDD for the Cambridge division, 74 EDD for the New Bedford division, and 84 EDD for both the Worcester and Framingham divisions were calculated based on a 1:50 probability of occurrence (Exh. NGC-1, at 27). The design day standard, as defined by the Company, represents the single highest EDD of the year, requiring the Company to have sufficient firm resources in place to serve its firm gas loads without relying on the uncertainties of the short tem markets during periods of severe winter weather (id. at 25).

NSTAR Gas notes that it has maintained the 1:50 planning standard for the design day since the Company cannot rely on the availability of short-term market area arrangements in meeting design day conditions (id.). Further, the Company states that, in its experience, the market has not yet matured to the point where NSTAR Gas can rely on the availability of non-contracted for transportation capacity at the city-gate during design day weather conditions (id.).

NSTAR Gas asserts that the derivation of its design day standards was similar to the methodology used for developing the design winter standard and consists of the average peak day EDD during the 1955-1995 period, the standard deviation around the average peak day, and a probability factor from the normal distribution (id. at 27). The Company states that its design day reflected the actual peak day that occurred during a 1994 cold snap (id. at 28). NSTAR Gas developed its cold snap analysis by using the actual EDD patterns of January 1994 within a design year with a recurrence probability of 1:33 for the winter season (id.). The Company affirms that it has the ability to meet customer demands in periods of extreme cold, under design conditions (id.).

b. Analysis and Findings

The Department finds that NSTAR Gas has performed an adequate analysis which complies with the Department precedent in this area by using a methodology approved by the Department in the previous fling. The Department notes that the Company has complied with the Department directive by taking into account the recent structural changes in the gas industry to select the design day standards. Accordingly, the Department finds that the Company's method for determining the design day standards is reviewable, appropriate, and reliable.

5. Conclusions on Planning Standards

The Department has found that NSTAR Gas used: (1) reviewable, appropriate, and reliable weather data for use in the development of its planning standards; (2) a reviewable, appropriate, and reliable normal year standard; (3) a reviewable, appropriate, and reliable design winter standard; and (4) a reviewable, appropriate, and reliable design day standard.

Accordingly, the Department finds that the Company's planning standards are reviewable, appropriate, and reliable.

III. DEMAND FORECAST

A. Standard of Review

Pursuant to G.L. c. 164, § 69I, the Department reviews the long-range forecast of each gas utility to ensure the forecast accurately projects the gas sendout requirements of the utility's market area. The Department's regulations require that the forecast reflect accurate and complete historical data, and reasonable statistical projection methods. See 980 C.M.R. § 7.02(9)(b). A forecast that is based on accurate and complete historical data, as well as reasonable statistical projection methods, should provide a sound basis for resource planning decisions. Colonial Gas Company, D.P.U. 93-13, at 2 (1995); 1992 Boston Gas Decision at 127; 1987 Berkshire Gas Decision at 56.

In its review of a forecast, the Department determines if a projection method is reasonable based on whether the methodology is (1) reviewable, that is, contains enough information to allow a full understanding of the forecast methodology; (2) appropriate, that is, technically suitable to the size and nature of the particular gas company; and (3) reliable, that is, provides a measure of confidence that the gas company's assumption, judgments, and data will forecast what is most likely to occur. D.P.U. 93-13, at 2; 1992 Boston Gas Company at 127; 1987 Berkshire Decision, at 55-56.

B. Forecast Methods

The Company forecasted demand for the following five customer classes: (1) residential heating; (2) residential non-heating; (3) commercial; (4) industrial; and (5) municipal (Exh.

NGC-1, at 30, Att. 4). The Company also presents forecasts for each of the Company's four operating divisions including Cambridge, Framingham, New Bedford, and Worcester (id.).

NSTAR Gas relied on multiple regression analysis for its forecast model (Exh. NGC-1, at 31, Att. 4).[6] First, the Company established a historical relationship between a dependent variable and one or more independent (explanatory) variables through regression analysis (id.). Second, the Company performed a forecast of the values of independent variables for the planning period (id.). Finally, NSTAR Gas applies the estimated parameters from the econometric model and combines them with forecasted values of the independent variables to forecast the future values of dependent variables (id. at 32, Att. 4).

1. Adjusted Sales Data Used in the Forecast

The Company states that DRI-WEFA's econometric model[7] incorporates the Company's sales data between 1978 and 2000 (Exh. NGC-1, at 34). To obtain consistent time series for that period, NSTAR Gas added the effects of the demand side management ("DSM") programs, transportation service, and interruptible service (id.).

NSTAR Gas asserts that the econometric forecast results of aggregate sales were then adjusted by removing forecasted load for DSM and firm transportation services to reach firm sendout requirements (id. at 30). The Company states that aggregate sales comprised of firm sales, DSM, interruptible sales and transportation, and firm transportation.

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6 NSTAR Gas retained DRI-WEFA, a leading economic and financial consulting company, to develop the Company's econometric forecast (Exh. NGC-1, at 8).

7 The econometric model is made up by 56 regression equations (Exh. NGC-1-S, Att. 4).

2. Service Territory Specific Data Availability

NSTAR Gas' service territory covers six different Massachusetts counties. The Company used economic and demographic data for each county (Exh. NGC-1, at 41). The Company also obtained the projected time series data for independent variables from DRI-WEFA's library of economic models of Massachusetts and its counties (id.). NSTAR Gas notes that although there is a high level of detail in the forecast values for potential independent values, the counties and combinations of counties used in modeling include geographic areas significantly larger than, and thus different from, the actual specific service territories included in the Company's four operating divisions. NSTAR Gas matched its four operating divisions to Massachusetts counties as follows: Cambridge Division – Middlesex County; Framingham Division – Middlesex, Norfolk, and Worcester Counties; New Bedford Division – Bristol and Plymouth Counties; Worcester Division – Middlesex and Worcester Counties (id.).

C. Residential Space Heating Demand Forecast

The Company indicates that the residential space heating class accounted for 58 percent of the Company's total firm sendout in 2000 (Exh. NGC-1, at 42). In addition, NSTAR Gas asserts that the average growth rate of 1.9 percent over the 1995-2000 period is due to the growth in the number of customers and a small increase in usage per customer (id.). The Company states that the trend toward conversion of non-heating customers to heating service also continues (id.). NSTAR Gas develops separate forecasts for the number of residential space heating customers and residential space heating sales (id.).

1. Number of Residential Heating Class Customers

The Company modeled the number of customers in each operating division as a function of residential customers in the prior year and the county level number of households in the current year (Exh. NGC-1, at 43). The Company used DRI-WEFA's database for the forecast values of relevant driver variables (id. at Att. 4, Table A.7). NSTAR Gas projected that the number of residential heating customers will grow at an annual rate of 0.71 percent over the forecast period reaching the total number of 201,517 customers by 2006 (Exhs. NGC-1, at 43; DTE 1-21).

2. Residential Heating Class Use per Customer

The Company computed the residential heating average usage per customer by dividing the sales forecast by the forecast of the number of customers (Exh. NGC-1, at 43). NSTAR Gas indicates that the average usage by residential heating customers is forecasted to grow slightly until 2003, and then begin to decrease (id. at 44).

3. Residential Heating Class Total Sales

The Company modeled the residential heating sales as a function of weather, number of customers, and the real price of gas to the residential sector (Exh. NGC-1, at 42). One exception to this is the Cambridge model where the Company asserts that the usage per customer in the prior period was used as an independent variable rather than the number of customers (id.).

Based on the forecasts, NSTAR Gas projected that its total sales to the residential heating class will increase from 22,633 BBtu in 2001 to 23,262 BBtu in 2006. This represents an annual growth rate of 0.55 percent (Exhs. NGC-1, at 44, Att. 4, Table A.7). The

Company states that sales in the New Bedford division are made up of sales to the Pine Hills[8] residential development in Plymouth County.

D. Residential Non-Heating Demand Forecast

NSTAR Gas indicates that the residential non-heating class consumed about 1.4 percent of the Company's firm sendout in 2000 (id.). The Company also states that the sales for this class have decreased at an average annual rate of 1.4 percent and that this decline is primarily the result of the on-going conversions of water and oil-based space heating customers to gas heating (id.). The Company states that the usage per customer was essentially flat over the 1995-2000 period (id.). The Company applied the same methodology in forecasting total sales for this class as it did for the residential heating class (id. at 45).

1. Residential Non-Heating Class Number of Customers

NSTAR Gas used the number of non-heating residential customers in the prior period and county level number of households in predicting the number of residential non-heating customers (Exh. NGC-1, at 45). The Company projected that the number of residential non-heating customers will decline at an annual rate of 0.24 percent over the forecast period, resulting in a total of 28,179 customers by 2006 (id. at 45; Att. 4, at Table A.7).

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[8] Pine Hills is a residential golf course community currently under construction and previously not served by natural gas. The sales forecast was based on the construction schedule and reflected customer demand of 20 BBtu in 2002, growing to 100 BBtu in 2006 (Exh. NGC-1, at 44, Att. 4, Table A.7).

2. Residential Non-Heating Class Use per Customer

NSTAR Gas states that the residential non-heating use per customer is calculated by dividing residential non-heating sales by the number of residential non-heating customers (Exh. DTE 1-26). The forecast yielded results that the average use per customer will decrease over the forecast period at an annual rate of 0.81 percent (Exh. NGC-1, at 45).

3. Residential Non-Heating Class Total Sales

NSTAR Gas modeled the sales as a function of household size and number of customers (Exh. NGC-1, at 45). One exception to this is the Worcester model where the Company asserts that only the number of customers proved to be significant (id.). NSTAR Gas states that the total sales to this customer category are projected to decline from 507 BBtu in 2001 to 479 BBtu in 2006, an annual percentage decline of 1.1 percent (Exh. NGC-1, at 46, Att. 4, Table A.7).

E. Municipal Demand Forecast

NSTAR Gas states that municipal sales represent a small percentage of the total sales for each division, ranging between 3.7 and 7.8 percent. However, the growth rate in the past five years for this segment was greater than the overall growth (Exh. NGC-1, at 46).

1. Number of Customers

The Company modeled the number of customers as a function of the numbers in the previous year and the number of households in the relevant region (id.). NSTAR Gas' forecast yielded an annual 1.9 percent growth rate between 2001 and 2006 (Exh. NGC-1, at 47, Att. 4, Table A.7).

2. Municipal Load

The Company used customers and weather as the primary explanatory variables in three out of the four operating divisions (id. at 47). The only exception is the Cambridge model, in which the aggregates sales were estimated on a usage per customer basis with sales per customer in the prior period as the primary driver (id.). NSTAR Gas' forecast results showed that municipal sales are expected to increase at an annual rate of two percent between 2001 and 2006 (Exh. NGC-1, at Att. 4, Table A.7).

F. Commercial Class Demand Forecast

1. Number of Commercial Customers (Sales and Transportation)

The Company stated that due to the increasing migration from firm sales to firm transportation service, a multi-step forecasting process is applied to forecast commercial firm sales and commercial firm transportation customers (Exh. DTE 1-43). NSTAR Gas first modeled the number of total commercial customers as a function of the number of commercial customers in the prior year and the county level service sector employment (Exh. NGC-1, at 48). The Company projected that the number of commercial customers will increase at an annual growth rate of two percent over the forecast period (id. at Att. 4, Table A.7).

Second, the Company modeled the commercial firm sales customers' share as a function of commercial firm sales customers' share in the prior year and time trend (Exh. DTE 1-43). Then, NSTAR Gas forecasted the number of commercial firm sales customers as the product of the forecast of total customers and the commercial firm sales customers' share (id.). Over the forecast period, the Company projected a rate of growth of the number of firm customers and of firm transportation of 1.68 percent and 6.55 percent, respectively (Exh. RR-DTE-1).

2. Commercial Load Forecast (Sales and Transportation)

The aggregate commercial sales, including both firm sales and transportation, represent approximately 27 percent of total throughput in 2000 (Exh. NGC-1, at 48). NSTAR Gas asserts that due to the increasing migration from firm sales to firm transportation service, a single regression equation is not sufficient to explain the variation in the historical data related to commercial load (id. at 49). A multi-step forecasting process is applied to forecast commercial firm sales and commercial firm transportation (id.).

The Company, first, modeled the sum of firm sales and firm transportation as a function of the number of customers and weather (id.). NSTAR Gas explains that the number of customers was the most significant variable to explain sales (id.). The Company states that the total sales to this customer category are projected to decline 5.4 percent over the forecast period (id. at 48). Second, NSTAR Gas modeled the share of commercial firm sales using the sum of the firms sales and firm transportation. To do so, the Company used previous years' data and a time trend (id. at 49). Then, NSTAR Gas forecasted firms sales as the product of the commercial load and the firm sales share. Finally, firm transportation was calculated as the remainder (id.).

NSTAR Gas states that the equations for the firm sales share produced valid statistical results (id.). The results for the commercial sector indicated that firm sales are expected to decrease at an annual rate of 6.94 percent while firm transportation volumes are expected to grow at an annual rate of 5.74 percent (Exh. RR-DTE-1).

G. Industrial Demand Forecast

1. Number of Industrial Customers (Firm and Transportation)

NSTAR Gas modeled the total number of industrial customers as a function of the previous year's number of customers except for the Worcester model where the total employment provided a better fit (Exh. NGC-1, at 51). The Company forecasted the number of firm sales and firm transportation customers in the same fashion as the number of commercial customers (id.). NSTAR Gas projected an annual decline of 0.49 percent in the number of industrial firm sales customers over the forecast period and an annual growth of 4.05 percent in the number of industrial firm transportation customers over the forecast period (Exh. NGC-1, Att. 4, at Table A.7).

2. Industrial Load Forecast (Firm and Transportation)

The aggregate industrial sales, including both firm and transportation, represent approximately 19 percent of the total throughput in 2000 (Exh. NGC-1, at 50). The sum of industrial firm sales and firm transportation was estimated as a function of real output (id. at 52). NSTAR Gas modeled the share of industrial firm sales in the same fashion as it did for the commercial sales (id.).

The Company indicates that industrial firm sales are projected to continue to decline at an annual average rate of 20 percent and that the industrial firm transportation volumes are projected to grow at an annual rate of 4.6 percent over the forecast period (id. at 51, Att. 4, Table A.7).

H. Validity and Predictive Power of the Model

NSTAR Gas asserts that the forecast is unbiased, practical, and highly reliable (Exh. DTE 2-5). To confirm the validity of the models, each of the 56 equations was evaluated with a broad range of statistical criteria including a high adjusted R-squared,[9] proper sign and reasonable magnitude of coefficients, significant t-values,[10] absence of serial correlation,[11] a high degree of confidence in overall fit (i.e., F-statistic), and reasonableness of forecast (id.).

Further, the Company employed an ex post facto analysis to evaluate its econometric model's predictive power (Tr. at 51). The analysis involved pulling the model back one year and comparing the normalized actual for 2001 to the prediction for 2001 (id. at 52). NSTAR Gas notes that the forecast of firm sales and firm transportation was within 0.4 percent of actual 2001 throughput (id.). According to the Company, these values represent remarkably good results (id.).

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9 The average R-squared was 0.92 for the Cambridge division's equations; 0.95 for the Framingham division's equations; 0.92 for the New Bedford division's equations; and 0.95 for the Worcester division's equations (Exh. NGC-1, at 35-36).

10 The Company states that it uses a five and/or ten percent level of significance to evaluate the statistical significance of the estimates of the independent variables (Exh. DTE 1-17). However, NSTAR Gas states that it retained some variables that were not significant at the ten percent level to obtain unbiased parameter estimates (Exhs. DTE 2-2; DTE 2-5). NSTAR Gas asserts that the omission of appropriate variables has the effect of causing the estimation to be biased and inefficient (id.). The Company used these variables to forecast the number of commercial customers in Cambridge division; the number of industrial customers in Cambridge, New Bedford and Worcester divisions; the industrial firm sales in Cambridge and Worcester divisions; and the commercial firm sales in the four divisions (Exh. DTE 2-2).

11 The Company tested for serial autocorrelation of order one using the Durbin-Watson test or "h" test. Whenever the results from the tests indicated the present of serial autocorrelation, NSTAR Gas reestimated the equations using the Cochrane-Orcutt method to correct for serial autocorrelation (Exhs. DTE 1-15; DTE 2-8).

I. Analysis and Findings

The econometric models developed by NSTAR Gas incorporate sufficient detail to ensure reasonable results for planning purposes. The Company: (1) used data sources of DRI-WEFA which had county specific forecasted values of economic and demographic variables, (2) prepared separate gas consumption models for residential heating, residential non-heating, municipal, commercial, and industrial groups of customers, (3) generated econometric forecasts in terms of number of customers and total throughput, (4) developed separate forecasts for firm sales and firm transportation for the commercial and the industrial sectors, (5) corrected the econometric equations for serial autocorrelation using an appropriate methodology, and (6) analyzed the predictive ability of its forecast model. The Company's forecast was done on the basis of each of the four operating divisions of the Company.

The Department finds that the Company has sufficiently documented its methodology of the demand forecast. The Department also finds that the Company developed its forecast based on econometric models that are suitable for the size and the nature of the Company. Additionally, the Department notes that the econometric methods employed by the Company are traditionally proven techniques and used extensively in the industry by local distribution companies. Further, the Department finds that the total forecast load is within an acceptable level of confidence. Therefore, the Department finds that the forecast developed by NSTAR Gas and the socioeconomic data used by the Company in preparing the forecast are reviewable, appropriate, and reliable.

IV. FIRM SALES AND TRANSPORTATION LOAD FORECAST

A. Methodology

The Company's econometric model does not directly forecast the actual firm sendout requirements (Exh. NGC-1, at 55). The Company first forecasts firm sales and firm transportation through the DRI-WEFA econometric models, and then adjusts these variables in order to derive forecasted total firm customer load (id.). Firm load, the load for which the company must plan capacity on its distribution system, is defined as follows:

Firm Load = Firm Sales + Capacity-Eligible Firm Transportation + Line Loss and Company Use + MIT and Pine Hills

(id.).

1. Transportation Migration

The relevant load for capacity planning purposes is defined as follows:

Capacity Eligible Transportation Load = Firm Transportation load - Grandfathered load - New transportation load (not previously served as firm-sales load)

(id. at 56).

Grandfathered transportation customers who elected transportation service as of February 1, 1999 are considered "capacity-exempt." This capacity-exempt load is 8,727 BBtu, which is equivalent to 9,037 BBtu on a weather normalized basis (id.).

New firm transportation load consists of new customers (not previously served as sales customers), customers migrating from other services, as well as the growth of the grandfathered load (id. at 57). Capacity-eligible transportation is then derived by subtracting the grandfathered customer load and new transportation load from the firm transportation load (Exh. NGC-1, at 58). Weather normalized, the resulting capacity-eligible firm transportation

load is 2,211 BBtu in 2001, which is forecast to increase to 5,407 BBtu in 2006 (id.).[12] Residential transportation migration is forecast to be nominal, and is therefore not represented in this supply plan (id. at 60). In addition, the Company's forecast assumes that there will be no reverse migration from transportation (Tr. at 42).

2. Line Loss and Company-Use Gas

The Company indicated that the forecast of line loss, which in the year 2000 was less than 0.3 percent of total throughput, was based on historical data, and adjusted for a growth trend. Actual line loss in the year 2000, however, represented less than 0.2 percent of firm throughput (Exh. NGC-1, at 60).

3. MIT and Pine Hills

The forecast for the MIT generation facility is derived from the Company's contract with MIT. The daily contract volume is 5,500 MMBtu with an annual volume of 1,897.5 BBtu (Exh. NGC-1, at 60**)**. The forecast for the Pine Hills community was provided by the Company's sales department. The supply forecast for Pine Hills increases from a yearly use of 20.8 BBtu in 2002 to 101.4 BBtu in 2006 (Exh. NGC-1, at 60-61, Table V-4).

B. Normal Year Sendout

NSTAR Gas states that it calculates its sendout requirements for firm load as the sum of firm sales, capacity-eligible firm transportation, line loss, company use, the MIT generation facility, and the Pine Hills development (Exh. NGC-1, at 56, 61). The Company's sendout requirement for firm load is forecast to increase only marginally at an average of 0.45 percent

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[12] This indicates an annual average growth rate of 19.6 percent (Exh. NGC-1, at 58).

per year (Exh. NGC-1, at 61,Table V-5). It's total firm sendout increases 2.24 percent during the supply planning period of 2001 to 2006 (id.).

Growth is led by the Framingham division, which the Company indicates will grow by a total of 6.29 percent during the 2001 to 2006 supply planning period (id. at 62, Table V-7). High migration is forecast to cause negative growth in the Cambridge division, indicating an average decline of -0.9 percent per year (id. at 61, Table V-6).

1. Cambridge Division

The Company indicated that the overall firm sendout is expected to decline 4.5 percent from 2001 to 2006 (Exh. NGC-1, at 61). In this particular division, the Company forecasts a decline in firm sales of twelve percent (id.). Growing activity in the industrial sector is expected to offset the declining growth rates in the other three sectors (id. at 61).

2. Framingham Division

The Company expects the Framingham division to experience an overall firm load increase of 6.29 percent or approximately 1.31 percent per year, although firm sales will remain about the same throughout the forecast period (id. at 62). The majority of the growth is expected to come from the industrial sector, which is projected to grow at a 6.7 percent annual increase (Exh. NGC-1, at 16, Att.4). [13]

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[13] This compares to a 5.5 percent annual decrease which occurred during the last five years of the historical period (Exh. NGC-1, at 16, Att.4).

3. New Bedford Division

The Company indicated that the New Bedford division is expected to experience a growth in firm load of three percent over the forecast period, or 0.60 percent per annum (Exh. NGC-1, at 62, Table V-8). Firm sales, however, will decrease at 3.18 percent through 2006 (id.). All sectors are expected to grow marginally between one and two percent, although all of the growth in the commercial and industrial sectors will be in transportation (Exh. NGC-1, at 16, Att.4).

4. Worcester Division

The Company expects firm load in the Worcester division to grow at 2.8 percent throughout the forecast period of 2001 to 2006 (Exh. NGC-1, at 62, Table V-9). Firm sales, however, are expected to decline by 14 percent (id.).

C. Design Year Firm Load Sendout

Employing a winter season standard of 1:33 years, the Company converts its annual forecast into monthly, and then daily, baseload and heating load per degree day factors with which to develop the design year and design day forecasts (Exh. NGC-1, at 63). To convert the forecasts of annual firm sales and capacity eligible transportation sendout load into monthly sendout, the Company used historical monthly firm sale and firm transportation data (Exh. NGC-1, at 63).

To determine the heat sensitive portion of the load, the Company employed the average daily firm sendout of the non-heat sensitive months of July and August as "baseload" (id.). The Company then subtracted that subsequent baseload amount from each month's total firm requirements to yield the heat sensitive portion of the load (id.). Dividing this heat sensitive

sendout by monthly normal EDDs yielded monthly heating load per effective degree-day or "heat factors" (id.). The Company achieved the design year standard by altering the normal year EDD patterns to the design year patterns (id. at 64).

D. Design Day Sendout

To obtain the design day sendout, NSTAR Gas applied the EDDs for the design day, January 16, to the computed January heat factors (Exh. NGC-1, at 64). The Company states that this design day calculation represents the most severe test of its system's capabilities, and is based on a 1:50 design year standard (Exh. NGC-1, at 64-65, Table V-11).

E. Firm Requirements Under Sensitivity Analysis

The Company states that the greater the sensitivity of the Company's forecast to changes in key underlying variables, the greater the importance of the flexibility of the supply portfolio in adjusting to these potential changes (id. at 65). The Company indicates that the DRI-WEFA econometric model used to forecast NSTAR Gas' gas throughput was run with changed forecast drivers depicting both "high" and "low" economic growth scenarios (Exh. NGC-1, at 65).[14] The economic and demographic data varied in the models included county population, income, output, number of households, and service and manufacturing employment (id. at 14, Att. 4).[15] These scenario forecasts were then used to develop forecasts of firm sales and

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[14] These scenario forecasts were developed to provide a 95 percent confidence interval (Exh. NGC-1, at Att. 4, C).

[15] Weather, price, and the "dummy" variable series were excluded since NSTAR Gas accounts for weather separately, as a part of its design year forecasting process. Similarly, base case gas and oil prices were not altered due to the myriad of national and international forces driving energy prices (Exh. NGC-1, at Att. 4, C).

capacity-eligible transportation customers. (id. at 65). NSTAR Gas maintains that the sendout forecast for the two scenarios demonstrates a spread of +/- 0.45 percent and +/- 0.52 percent depicting low growth to high growth respectively (id. at 66, Table V-12).

F. Analysis and Findings

The DRI-WEFA econometric model forecasted the firm sendout requirements based on the aggregate sales forecast for normal year, design year, and design day. These techniques and derivations are reasonable and consistent with other LDC applications approved by the Department. See e.g., 2000 Commonwealth Gas Decision, at 22.

The Company evaluated the effect of transportation migration on firm load by subtracting "grandfathered" transportation load and "new" firm transportation load[16] from the total firm transportation load, thereby adding only "capacity-eligible firm transportation", line loss, Company use, the MIT, and Pine Hills contracts. Unlike the 2000 Commonwealth Gas Decision, where the Company "lacked past experience and related data"[17] due to the newness of the deregulated industry, the Company now has a better understanding of the effects of transportation migration on its service territory. In addition, the techniques used in the development of these estimates are traditionally proven and reasonable. Thus, the Department finds that the Company's forecast of transportation migration is appropriate, reviewable, and reliable. In making this finding, the Department finds that NSTAR Gas has incorporated its

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[16] New firm transportation load consists of new customers (not previously served as sales service), customers migrating from other services, and the growth of the grandfathered load (Exh. NGC-1, at 57).

[17] 2000 Commonwealth Gas Decision, at 17.

transportation migration experience into its forecast as directed in 2000 Commonwealth Gas Decision, at 22.

The Company also performed sensitivity analyses of sendout forecast to potential changes in key driver variables (Exh. NGC-1, at 65). Using the "high" and "low" economic growth scenarios developed in the DRI-WEFA econometric model, these forecasts, in turn, were developed into the "high" and "low" of firm sales and capacity-eligible transportation customers with a 95 percent confidence interval (id.). This yielded an overall spread of +/- 0.45 percent and +/- 0.52 percent from the base case sendout forecasts (id. at 65-66).

Accordingly, the Department finds that the Company's overall methodology in forecasting the sendout requirements is appropriate because it contains enough information to allow a full understanding of the forecast methodology. Furthermore, the technical analysis used in its sendout forecast is suitable to the size and nature of the Company and presents a measure of confidence that the Company's assumptions, judgment, and data will produce an accurate forecast. For these reasons, the Department finds that the Company's forecast of sendout requirements for the normal year, design year, and design day sendout for the residential, commercial industrial, and municipal rate classes is appropriate and reliable.

V. THE SUPPLY PLAN

A. Standard of Review

The Department is required to ensure "a necessary energy supply for the Commonwealth with a minimum impact on the environment at the lowest possible cost." G.L. c. 164, § 69I. In fulfilling this mandate, the Department reviews a gas company's supply planning process and the two major aspects of every utility's supply plan -- adequacy and

cost.[18] Commonwealth Gas Company, D.P.U. 92-159, at 53 (1995); Colonial Gas Company, D.P.U. 93-13, at 49-50 (1995); 1992 Boston Gas Decision at 201.

The Department reviews a gas company's five-year supply plan to determine whether the plan is adequate to meet projected normal year, design year, design day, and cold-snap firm sendout requirements.[19] In order to establish adequacy, a gas company must demonstrate that it has an identified set of resources that meet its projected sendout under a reasonable range of contingencies. If a company cannot establish that it has an identified set of resources which meet sendout requirements under a reasonable set of contingencies, the company must then demonstrate that it has an action plan which meets projected sendout in the event that the identified resources will not be available when expected. Colonial Gas Company, D.P.U. 96-18, at 31 (1996); Commonwealth Gas Company, D.P.U. 92-159, at 54 (1995); Colonial Gas Company, D.P.U. 93-13, at 50 (1995).

In its review of a gas company's supply plan, the Department reviews a company's overall supply planning process. An appropriate supply planning process is essential to the development of an adequate, low-cost, and low environmental impact resource plan. Pursuant to this standard, a gas company must establish that its supply planning process enables it to

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[18] G.L. c. 164, § 69I also directs the Department to balance cost considerations with environmental impacts in ensuring that the Commonwealth has a necessary supply of energy. Colonial Gas Company, D.P.U. 96-18, at 31 (1996); Commonwealth Gas Company, D.P.U. 92-159, at 53 (1995); Colonial Gas Company, D.P.U. 93-13, at 50 (1995).

[19] The Department's review of reliability, another necessary element of a gas company's supply plan, is included within the Department's consideration of adequacy. See Colonial Gas Company, D.P.U. 93-13, at 50, n.22 (1995); 1992 Boston Gas Decision at 201, n.87; Boston Gas Company, 16 DOMSC 173, at 214 (1987).

(1) identify and evaluate a full range of supply options, and (2) compare all options -- including conservation and load management ("C&LM") -- on an equal footing. D.P.U. 96-18, at 31; D.P.U. 92-159, at 54; D.P.U. 93-13, at 51; 1992 Boston Gas Decision at 202.[20]

Finally, the Department reviews whether a gas company's five year supply plan minimizes cost. A least-cost supply plan is one that minimizes costs subject to trade-offs with adequacy and environmental impact. D.P.U. 92-159, at 55; D.P.U. 93-13, at 51-52; 1992 Boston Gas Decision at 203. Here, a gas company must establish that application of its supply planning process has resulted in the addition of resource options that contribute to a least-cost plan.

B. Goals and Objectives

NSTAR Gas asserts that it has assembled a flexible and diverse portfolio of resources with which to meet its obligation to provide least-cost and reliable service to its firm customers. To this end, the Company identifies, evaluates, and acquires the amount and mix of supplies and capacity that minimizes cost while reliably meeting firm demand requirements (Exh. NGC-1, at 67).

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[20] G.L. c. 164, § 69I, requires a utility company to demonstrate that its long-range forecast "include[s] an adequate consideration of conservation and load management." Initially, the Siting Council reviewed gas C&LM efforts in terms of cost minimization issues. In the 1988 Commonwealth Gas Decision, at 122-126, the Siting Council expanded its review to require a gas company to demonstrate that it has reasonably considered C&LM programs as resource options to help ensure that it has adequate supplies to meet projected sendout requirements.

C. Description of Supply Model

NSTAR Gas uses New Energy Associates' SENDOUT linear programming optimization model to calculate the least-cost dispatch of existing and incremental resources to meet the Company's load requirements (Exh. NGC-1, at 69). The Resource Mix module is an extension of the basic SENDOUT model and allows optimization of existing and new contract capacity levels by taking into account fixed charges as well as variable costs (id. at 71). The Company utilizes the output produced by the model to identify the mix of resources required, excess resources, supply shortages, and the costs of serving demand (id. at 72). The results provide the basis for the Company's five-year gas supply portfolio plan, including any modifications required to meet projected demand (id.).

The Company concludes that the SENDOUT model provides a mechanism for a detailed simulation of the least-cost dispatch of the Company's supply resources under alternative demand scenarios (Exh. NGC-1, at 72). In the case of NSTAR Gas, the SENDOUT model serves as the Company's primary planning tool for testing the operational and economic consequences of a wide variety of supply and DSM alternatives (id.).

D. Supply Planning Process

1. Standard of Review

The Department has determined that a supply planning process is critical in enabling a utility company to formulate a resource plan that achieves an adequate, least-cost and low environmental impact supply for its customers. D.P.U. 94-14, at 36**;** D.P.U. 93-13, at 70; 1992 Boston Gas Decision at 223; Boston Gas Company, 19 DOMSC 332, at 388 (1990) **(**"1990 Boston Gas Decision")**.** The Department has noted that an appropriate supply planning

process provides a gas company with an organized method of analyzing options, making decisions, and re-evaluating decisions in light of changed circumstances. Id. For the Department to determine that a gas company's supply planning process is appropriate, the process must be fully documented. D.P.U. 93-13, at 70; 1992 Boston Gas Decision at 223; 1987 Berkshire Gas Decision at 84.

The Department's review of a gas company's process for identifying and evaluating resources focuses on whether the company: (1) has a process for compiling a comprehensive array of resource options -- including pipeline supplies, supplemental supplies, DSM, and other resources; (2) has established appropriate criteria for screening and comparing resources within a particular supply category; (3) has a mechanism in place for comparing all resources, including DSM, on an equal basis, i.e., across resource categories, and (4) has a process that as a whole enables the company to achieve an adequate, least-cost, and low environmental impact supply plan. D.P.U. 94-140, at 37; D.P.U. 93-13, at 70; 1992 Boston Gas Decision at 224; 1990 Boston Gas Decision at 54-55.

As set forth in Section IV.A. above, the Department reviews a gas company's five-year supply plan to determine whether it minimizes cost, subject to trade-offs with adequacy and environmental impact. D.P.U. 94-140, at 37; D.P.U. 93-13, at 88; 1992 Boston Gas Decision at 236; 1987 Boston Gas Decision at 214. A gas company must establish that the application of its supply planning process, including adequate consideration of DSM and consideration of all resource options on an equal basis, has resulted in the addition of resource options that contribute to a least-cost supply plan. D.P.U. 94-140, at 37; D.P.U. 93-13, at 83; 1992 Boston Gas Decision at 233; 1986 Berkshire Decision at 115. As part of this review, the

Department requires gas companies to show, at a minimum, that they have completed comprehensive cost studies comparing the costs of a reasonable range of practical supply alternatives prior to selection of major new resources for their supply plans. D.P.U. 94-140, at 37; D.P.U. 93-13, at 89**;** 1992 Boston Gas Decision at 236; 1986 Gas Generic Order at 100-102.

2. Identification and Evaluation of Resources Alternatives

a. Supply-Side Resources

The Company states that it maintains continuous contact with the market through formal and informal solicitations for new resources (Exh. NGC-1, at 73). The Company, therefore, has a large number of potential suppliers to whom to send Requests for Proposals ("RFPs") when, or if, a particular need arises (id.). Should the Company incur an incremental need for capacity, NSTAR Gas explains that it considers a wide scope of potential resource options and looks to all potential qualified vendor(s) to meet the need on a least-cost basis, consistent with the Company's cost and non-cost criteria (id.). NSTAR Gas further states that it generally evaluates new resources based on cost and non-price characteristics including reliability, availability, diversity of supply, flexibility, financial viability, and other relevant ancillary criteria that may apply to a particular supply source (id. at 74).

i. Cost Analysis

According to NSTAR Gas, the goal of cost analysis is to determine the Company's total portfolio cost over the planning horizon for each resource option in question (Exh. NGC-1, at 74). The Company employs the SENDOUT optimization model to determine the choice and

size of an optimal mix of resources in a manner that minimizes the cost of the portfolio and remains consistent with operational constraints (id. at 74).

ii. Analysis of Non-Cost Factors

The Company states that factors such as reliability, diversity, flexibility, and financial viability are among the non-cost attributes analyzed when choosing each resource alternative (Exh. NGC-1, at 75). NSTAR Gas explains that reliability is a crucial qualitative factor that refers to the ability of a supplier to fulfill commitments based on past performance, its operational strengths and proffered terms and conditions (id.). Diversity refers to a potential supplier's ability to access supplies from a variety of producing basins, to engage in trading activities in several market areas and on different pipelines, as well as to access storage and transportation resources (id.). The Company maintains that one measure of flexibility is a potential supplier's ability to adjust supplies to match changing system demands caused by temperature or other factors, and that NSTAR Gas attempts to build a portfolio around a mix of resources that include such determinants of flexibility (id. at 76).

b. Demand-Side Resources

The Company identifies and evaluates energy efficiency on an equal basis with available supply-side options (Exh. NGC-1, at 76). The Company asserts that the avoided cost estimates used to screen DSM programs were developed by Resource Insight and Synapse Energy Economics and that these estimates also support NSTAR Gas' most recent energy efficiency programs filed in NSTAR Gas Company, D.T.E. 01-26 (2000) (id. at 77). Screening is then conducted using a total resource cost ("TRC") test, as specified by the Department in D.T.E. 98-100 (2000) (id.). The Company states that the TRC test also takes into account the direct

economic benefits and costs of a program to participating customers (id.). The Company's asserts that its cost-effectiveness screening model's (the "Model") key feature is its ability to include in the benefit/cost analysis estimated market effects resulting from a utility-sponsored energy efficiency program (Exh. NGC-1 at 77). The Model also includes the effects of direct program participation and market spillover (id.). Finally, the Company establishes that the savings generated by the approved DSM activities have provided cost-effective resources in its optimized resource portfolio (id. at 79).

E. Application of the Process

The Company states that, since the implementation of FERC Order No. 636, in continually seeking ways to reduce the cost of serving its firm sales customers without compromising the reliability of service, NSTAR Gas has used capacity release, off-system sales, and portfolio asset management strategies to manage its supply resources (Exh. NGC-1, at 79).[21] The Company asserts that, due to the continuing process of retail restructuring, it continues to pursue a strategy of short-term (one year or less) contracts for commodity purchases (id.).

1. Tennessee Gas Pipeline - Contract Restructuring

The Company explains that it has several contracts on the Tennessee Gas Pipeline ("Tennessee") that were set to expire on November 1, 2000, and decisions had to be made as to whether to extend these contracts for a term of up to five years or terminate them on a one-

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[21] During 1999 and 2000, the Company generated $4.5 million and $6.7 million, respectively, in mitigation margins through such activities (Exh. NGC-1, at 79).

year written notice (Exh. NGC-1, at 80). Pursuant to negotiations with Tennessee, the Company made the following changes:

- Tennessee Longhaul Transportation Contracts

  The Company renewed the 365-day gas transport contract for a three-year time period to coincide with the Department's three-year transition period. According to the Company these contracts are the most cost-effective resource with which to serve the Worcester Division, NSTAR Gas' largest service area (Exh. NGC-1, at 81).

- Tennessee FS Storage and Associated Transport

  The Company asserts that since these contracts provide the right to store gas in Tennessee's market-area storage, to transport gas from storage to the Company's city-gates, and are among the most cost-effective rates of all storage providers, the Company elected to extend these contracts for a three-year period (Exh. NGC-1, at 81).

- Tennessee Production Area Shorthaul Contract

  The Company explains that it determined that the renewal of this contract, which is a 365-day contract used to transport gas from the production area to downstream interconnecting pipelines, was not a least-cost option; therefore, NSTAR Gas chose to buy out of the contract thereby saving approximately $762,000 over the three-year period (id. at 81-2).

- Tennessee Market Area Shorthaul Contract

NSTAR Gas states that the term of this contract, used to deliver quantities of gas from a third-party storage facility to the Company's city-gates, has been reduced to be consistent with the Department's transition period (id. at 82).

2. Algonquin Gas Transmission - Contract Termination

- AFT-1 Transportation Contract 86005

The Company states that this contract was terminated because it did not provide primary firm receipt and delivery points, and that the termination of this contract resulted in annual demand charge savings of approximately $213,000, while maintaining the existing level of firm deliverability to NSTAR Gas' Algonquin city-gates (Exh. NGC-1, at 83).

3. Texas-Eastern Transmission - Contract Termination Notice

- NSTAR Gas asserts that this 365-day contract, used to transport gas from the production area to downstream interconnecting pipelines, could be terminated without affecting the city-gate deliverability. This contract, that has a five-year termination notice provision, will terminate on April 1, 2003 (id. at 83).

4. Dominion Transmission

- The Company maintains that this contract provides storage service at Ellisburg, Pennsylvania and delivers storage gas into Tennessee. The primary term of this contract expired on March 31, 2001 (id. at 83). The Company extended the contract for three years until March 31, 2004 because it is one of the more cost-effective storage services available (id. at 84). Additionally, the Company

extended a transportation contract that provided a connection to F-2 capacity until March 31, 2003 (id.).

5. Capacity Assignment

- NSTAR Gas explains that 15,599 MMbtu/day[22] of pipeline transportation, storage, and liquified natural gas ("LNG") deliverability has been assigned to marketers since the Department's 1999 Order regarding mandatory capacity assignment of LDC portfolio resources to customers migrating to transportation service after February 1, 1999 (Exh. NGC-1, at 84). The annual demand charge associated with these assignments is $2,718,700, which is credited to firm sales customers. (id.).

6. Pending Contract Notifications

- The Company notes that during the forecast period, the contract terms of many of its critical contracts will expire (Exh. NGC-1, at 85). Among these are the majority of its Tennessee contracts that are critical for serving the Worcester Division (id.). NSTAR Gas further explains that its resource portfolio will assume the renewal of all expiring transportation and storage contracts during the forecast horizon (id.).

NSTAR Gas maintains that it has had to make decisions on contract renewals while balancing competing objectives since the issuance of the Gas Unbundling Order (id. at 85-86).

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22 This amount equals to 11.1 percent of the Company's total pipeline transportation, storage and transport, and LNG deliverability resources (Exh. NGC-1, at 85).

Therefore, the Company evaluates contract-renewal decisions during the forecast period using several criteria: (1) whether the capacity is needed to meet current and future design day and design season requirements; (2) whether alternatives that are equally reliable and more cost-effective exist; and (3) input from marketers currently being assigned capacity under the Company's mandatory capacity assignment program (id. at 86).

F. Positions of the Parties

1. Attorney General

The Attorney General requested that the Department reject the Company's proposed supply plan and require the Company to resubmit a plan which provides for adequate gas supplies (Attorney General Brief at 1).

The Attorney General argues that the Company did not account for 850 residential customers, in the Ponds of Plymouth development, in its customer load for its proposed forecast. (Attorney General Brief at 3-4). The Attorney General contends that unaccounted for load will result in a deficiency of 90,000 MMBtu in 2002/2003 and over 460,000 MMBtu in 2005/2006 (id.). Finally the Attorney General argues that the overall LNG inventory under design conditions will run out (Attorney General Brief at 3-4).

2. NSTAR Gas

The Company argues that the effect of the 850 residential customers in the Ponds of Plymouth residential community, would affect the design year deficiency by approximately 60,000 MMBtus beginning in 2002/2003. This incremental design-planning shortfall can be served by LNG or other supplemental supplies readily available in the marketplace (Tr. at 40-41; NSTAR Gas Brief at 9-10, n.6).

This new load is in the New Bedford division, but the shortage shows up in overall resources, which are not necessarily the Company's LNG resources (Tr. at 41; NSTAR Gas Brief at 9-10, n.6). The Company states that it plans to meet the increased deficiency through a supplier who will be able to supply city-gate delivery services for the winter season on a five-month basis (Tr. at 40; NSTAR Gas Brief at 9-10, n.6). The Company argues that planned increases in pipeline capacity and gas supplies in the New England region should also ensure that supplemental supplies are available when needed (NSTAR Gas Brief at 10).

3. Analysis and Findings

The Company has provided evidence that it has in place a resource planning process that ensures its ability to acquire least-cost supplies. With the use of the SENDOUT model, NSTAR Gas is able to take physical limitations and contract constraints into account and determine the minimum cost dispatch for a particular period. In addition to least-cost parameters, the Company takes into account the important non-price factors of reliability, supply diversity, flexibility, and demand side management activity. The Department finds that NSTAR Gas has shown that the application of these processes has resulted in the development of a supply portfolio that contributes to a least cost supply plan.

The Attorney General's concerns of deficiency in supply due to increased customer load, starting in 2002/2003, will be met by the Company's procurement of supplemental marketplace supplies, LNG, and increases in pipeline capacity and gas supplies to the New England region. This will allow the Company to avoid long term commitments for incremental long term pipeline or storage capacity.

The Department recognizes the Company's effectiveness in identifying resources that are consistent with the Company's expressed portfolio objectives.

Accordingly, the Department finds that the Company has formulated an appropriate process for the identifying a comprehensive array of supply options, and has developed appropriate criteria for screening and comparing supply resources.

G. Comparison of Resources and Requirements

1. Base Case Supply Plan

Under this section the Department analyzes and reviews the adequacy of the Company's supply plan through the supply resources available to meet its demand and maintain its firm load sendout requirements. The portfolio resources available to meet these requirements include pipeline transportation contracts, storage contracts, gas supply contracts, supplemental resources, and DSM resources. The Department reviews the sufficiency of the Company's supply plan, supply planning process, and the costs of the plan.

a. Transportation and Storage Contract Supplies

The Company indicates the following firm portfolio resources :

	Maximum Daily Quantity MMBtu/Day (MDQ)	Annual Contract Quantity MMBtu/Year (ACQ)
Algonquin Gas Pipeline		
Firm- Longhaul	92,922**	30,622,702
Firm- Storage	49,624**	14,048,644^
Firm-Transportation Service	40,000	6,040,000
Total Firm Delivery Algonquin	142,546	50,711,346
Tennessee Gas Pipeline		
Firm-Longhaul	47,387**	17,296,255
Firm-Shorthaul Via Iroquois	4,500**	1,642,500
Firm-Shorthaul Storage	27,472**	10,027,280^
Total Firm Delivery Tennessee	79,359	28,966,035
Liquefied Natural Gas		
Hopkinton LNG ^^	180,000**	3,120,000^^
Acushnet LNG ^^	30,000**	530,000 ^^
System Total Capacity (Not Additive)		
Maximum Peak Daily Deliverability	431,905	
Maximum Annual Deliverability		77,287,387

** Indicates the components of Maximum Peak Day Deliverability, which also includes 77,096 MMBtu of maximum storage withdrawal.

^ Indicates the components of Maximum Annual Deliverability, which also includes 7,579,000 MMBtu of storage capacity.
^^ Annual totals represent total capacity, including heel.
(Exh. NGC-1, at 90, Table VII-1).

b. Gas Supplies

Since first presented with the opportunity to restructure the gas-supply portion of its portfolio as a result of FERC Order 436, and subsequent orders, the Company has sought to acquire reliable, flexible, and low cost supplies to meet its needs (Exh. NGC-1, at 91). The Company uses an RFP process to acquire gas supplies. The same RFP process has been used to obtain asset optimization proposals from suppliers, through which certain of the Company's storage resources have been managed by third parties. These arrangements have taken the form of storage refill programs or asset management arrangements (Exh. NGC-1, at 91).

The Company entered into a third party recallable, upstream asset management contract for one year beginning November 1, 2001 with Dynegy Marketing and Trade to supply the Company's city-gate requirements for firm sendout (id. at 92).

c. Supplemental Facilities

The Company utilizes a full services agreement with its affiliate company, Hopkinton LNG Corporation, which owns LNG facilities in both Hopkinton and Acushnet, Massachusetts. Under its agreement with Hopkinton LNG Corporation, the Company is entitled to 100 percent of the liquefaction, vaporization, and storage capacity of these facilities (id. at 92). The Company evaluates, on a year-to-year basis, contracts for additional LNG supplies in liquid and/or vapor depending on LNG storage levels, load requirements, and the relative cost of such contracts in relation to the Company's other supply resources (id. at 93).

Delivery of LNG vapor to the Company's distribution system is accomplished through the Marathon pipeline interconnection. The Marathon pipeline, located near the Hopkinton LNG site interconnects with the Tennessee and Algonquin pipelines enabling the Company to inject LNG vapor directly into either pipeline. The Company also has the capacity to vaporize LNG directly into its distribution system (id. at 93).

2. Adequacy of the Supply Plan

In reviewing adequacy, the Department first examines whether the company's base case supply plan is adequate to meet its projected normal year, design year, design day and cold-snap firm sendout requirements. If so, the Department reviews whether the company's plan is adequate to meet its sendout requirements if certain supplies become unavailable. If the supplies are not found to be adequate under the base case and contingency plans, then the company must establish that it has an action plan to obtain the supplies required to meet the projected firm sendout requirements. See D.P.U. 93-13, at 62; 1992 Boston Gas Decision at 212-213; 1987 Berkshire Gas Decision at 76.

a. Normal Year and Design Year Adequacy

The Company's normal year weather pattern is based on a 46 year average of EDD. The Company has submitted a supply plan for meeting its normal year sendout and storage refill requirements. The plan shows that the Company has adequate resources to meet forecasted sendout and storage refill requirements under normal conditions throughout the forecast period for both the normal and design year in 2001/2002. In the later years of the forecast the Company will obtain the supplies to meet its design winter requirements, 28 BBtu in 2002/2003 to 397 BBtu in 2005/2006, when the Company will rely on LNG and

supplemental supplies to meet the needed requirements (Exh. NGC-1, at 93, Table G-22D). The Company expects that the planned increases in pipeline capacity and gas supplies in the New England region will ensure that supplemental supplies are available when needed (id. at 94, Table G-22D).

With regard to future levels of transportation migration, which affects the demand for the Company's firm sales service, a flexible supply plan has been developed. The Company has experienced an increase in firm transportation and is projecting an annual growth rate of 4.6 percent over the forecast period (Exh. NGC-1, at 51).

Based upon the above, the Department finds that the Company has established a normal year supply plan that is adequate to meet the Company's forecasted sendout requirements and storage refill requirements throughout the forecast period.

b. Design Day Adequacy

The Company must have an adequate supply capability to meet firm customers' design day requirements. The total supply capability necessary for meeting design year requirements is a function of the aggregate volumes of gas available during the contract period. Design day supply capability is determined by the maximum daily deliveries of pipeline gas, the maximum rate at which supplemental fuels can be dispatched, and the quantity of CL&M that is available on a design day.

The Company's plan shows that it has adequate resources to meet its forecasted firm design day sendout requirements (Exh. NGC-1, at 95, Tables VII-4, G-23). Accordingly the Department finds that the Company has established that its design day supply is adequate to meet the Company's sendout requirements for the forecast period.

c. Cold Snap Analysis

The Company's winter design standard incorporates a ten day cold snap into the coldest month, January. This is based on the 46-year historical record of the Company's four divisions (Exh. NGC-1, at 95).

The Company's SENDOUT model demonstrates that its supply portfolio adequately meets demand, assuming market area purchases are meet (id. at 96). This dispatch supply model demonstrates the Company's ability, under design weather conditions, to supply an extraordinary cold snap period adequately and reliably (Exh. NGC, at 95-96).

d. Growth-Scenario Analysis

To establish a more precise forecast for growth-scenario analysis, the Company developed both a Low Demand and a High Demand scenario, (Exh. NGC-1, at 65). These scenarios were developed to provide a 95 percent confidence level in the forecast of the independent "drivers" included in the economic forecast. The sendout results of the two scenarios are then adjusted to design weather conditions to determine the adequacy of the portfolio under the alternative scenarios (id. at 97, Tables VII-5, VII-6). The results of the two scenarios showed some deficiencies during the 2005/2006 period in the amount of 498 BBtu. The Company states that this shortfall will be met by market-area or city-gate arrangements (id. at 97). The Company will continue to monitor this shortfall on a yearly basis and assess the possibility that the high-growth scenario may materialize, at which time it will further assess additional resources that can be evaluated and may need to be procured (id. at 98).

H. Conclusions on the Supply Plan

The Department has found that the Company has: (1) formulated an appropriate process to identify a comprehensive array of supply options, and has developed appropriate criteria for screening and comparing resources; (2) formulated an appropriate process for identifying a comprehensive array of DSM options, and has developed appropriate criteria for screening and comparing DSM resources; and (3) incorporated both supply-side and demand-side options in its resource mix, and it has compared all resources, including DSM, on an equal basis and finds that the Company has developed an appropriate supply planning process.

The Department has also found that the Company has established that its normal year, design year, design day, and cold-snap supply plans are adequate to meet the Company's forecast sendout requirements throughout the forecast period. In addition, the Department has found that the Company has developed: (1) appropriate criteria for screening and comparing supply-side resources and demand-side resources, and (2) a mechanism to undertake the comparison of resources on an equal basis.

Finally, the Department has found that the Company's supply planning process as a whole may contribute to and may lead to a least-cost supply plan. According, the Department approves the Company's supply plan for the years 2001/2002 through 2005/2006.

VI. ORDER

Accordingly, after due notice, hearing and consideration, it is

ORDERED: That NSTAR Gas Company's petition for approval of its long-range forecast and supply plan be and hereby is APPROVED; and it is

FURTHER ORDERED: That NSTAR Gas Company comply with all of the directives contained herein, and it is

FURTHER ORDERED: That NSTAR Gas Company shall file its long-range forecast and supply plan with the Department by May 31, 2005

By Order of the Department,

_____
Paul V. Vasington, Chairman

_____
James Connelly, Commissioner

_____
W. Robert Keating, Commissioner

_____
Eugene J. Sullivan, Jr., Commissioner

_____
Deirdre K. Manning, Commissioner

Appeal as to matters of law from any final decision, order, or ruling of the Commissioner may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the Order of the Commission be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Secretary of the Commission within twenty days after the date of service of the decision, order, or ruling of the Commission, or within such time as the Commission may allow upon request filed prior to the expiration of twenty days after the date of service of said decision, order, or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the Clerk of said Court. (Sec. 5, Chapter 25, G.L. Ter. Ed., as most recently amended by Chapter 485 of the Acts of 1971).

ABBREVIATIONS LIST

Attorney General	Attorney General of the Commonwealth
C&LM	conservation and load management
Department	Department of Telecommunications and Energy
DOER	Division of Energy Resources
DSM	demand side management
EDD	Effective Degree Day
HDD	Heating Degree Day
LDCs	local distribution companies
LNG	liquified natural gas
MDQ	maximum daily quantity
1987 Berkshire Gas Decision	Berkshire Gas Company, 16 DOMSC 53 (1987)
1987 Boston Gas Decision	Boston Gas Company, 16 DOMSC 173 (1987)
1986 Berkshire Gas Decision	Berkshire Gas Company, 14 DOMSC 107 (1986)
1986 Gas Generic Order	Final Order on Evaluations of Standards and Procedures for Reviewing Sendout Forecasts and Supply Plans of Massachusetts Natural Gas Utilities, 14 DOMSC 95 (1986)
1990 Boston Gas Decision	Boston Gas Company, 19 DOMSC 332 (1990)
1992 Boston Gas Decision	Boston Gas Company, 25 DOMSC 116 (1992)
Plan	Long-Range Forecast and Supply Plan
Tennessee	Tennessee Gas Pipeline Company
2000 Commonwealth Gas Decision	Commonwealth Gas Company, D.T.E./D.P.U. 96-117 (2000)
TRC	total resource cost
RFPs	request for proposals
WSC	Weather Services Corporation